Amendments to the Drawings:

The attached sheets of annotated drawings include changes to Figs. 1 and 3. The replacement sheets, which include Figs. 1-4(d), replace the original sheets. In Fig. 1, "15" has been removed; in Fig. 3, "200" has been removed.

Attachments: Replacement Sheets (4)
Annotated Sheets Showing Changes (2)

REMARKS

Claims 1-21 are pending. Claims 1, 12 and 14 have been amended herein, and claims 19-21 added. Claim 12 was amended simply to put the claim in independent form, and Applicants submit the scope of the claim has not been changed by the amendment. Support for the claim amendments and new claims can be found throughout the originally filed specification, drawings, and claims. For example, support for the amendments to claims 1 and 14 as well as new claims 19 and 20 can be found on page 5, ¶¶ 20-21. Support for new claim 21 can be found, for example, in Fig. 1.

In the Office Action dated November 27, 2006, the Examiner took the following action: (1) objected to the drawings; (2) objected to the abstract; (3) objected to the specification for informalities; (4) rejected claims 10-11 and 14-18 under 35 U.S.C. § 112, second paragraph, as failing to distinctly claim the subject matter; (5) rejected claims 1-6, 8-11 and 14-18 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,824,664 to Austin et al. ("Austin"); (6) rejected claims 7, 12 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Austin in view of U.S. Patent No. 6,368,871 to Christel et al. ("Christel"); (7) rejected claims 1, 3, 5, 9 and 10 for double patenting over claims 1, 3-7, 14, 16-17 and 19-22 of U.S. Patent No. 7,014,747 to Cummings et al. ("Cummings 747") in view of Austin; (8) rejected claims 6 and 14 for double patenting over claims 1, 4 and 5 of copending Application No. 10/176,322 in view of Austin; and (9) rejected claims 1-3 for double patenting over claims 1 and 3-7 of copending Application No. 10/969,137.

Drawings

The Examiner objected to the drawings as including reference characters "15" in Fig. 1 and "200" in Fig. 3 not mentioned in the description. Applicants have included amended Figures 1 and 3 with these reference characters removed.

The Examiner objected to the drawings as the reference character "20" was referred to in the specification as both an 'outlet' and 'center'. Applicant has amended paragraph 23 to revise the reference to "20".

Specification

The Examiner requested correction of several informalities in the specification. Applicants have included the relevant specification amendments herein – to the abstract, ¶19 and ¶ 20.

Claim Rejections – 35 U.S.C. § 112

Claims 10-11 and 14-18 were rejected under 35 U.S.C. § 112, second paragraph. Applicants have amended independent claims 10 and 14 to provide proper antecedent basis for the terms in the claims. These amendments have not changed the scope of the claims.

Claim Rejections – 35 U.S.C. § 102

Claims 1-6, 8-11 and 14-18 were rejected under 35 U.S.C. § 102(e) as being anticipated by Austin et al. (U.S. Patent Number 6,824,664).

Disclosed embodiments of the invention will now be discussed in comparison to the applied Austin. Of course, the discussion of the disclosed embodiments, and the discussion of the differences between the disclosed embodiments and the subject matter described in the applied references, do not define the scope or interpretation of any of the claims. Instead, such discussed differences merely help the Examiner appreciate important claim distinctions discussed thereafter.

Applicants have disclosed embodiments of a dielectrophoresis device utilizing electrokinetic transport. See ¶¶ 20-21. Electrokinetic transport in a fluid is a combination of electrophoretic transport and electroosmotic transport.[1] Electrophoretic transport requires a particle to be charged, or have a non-zero electrophoretic mobility. Therefore, electrokinetic flow of *uncharged* polarizable particles requires the presence of the electroosmotic component of electrokinetic flow. Prior art systems typically suppressed electroosmotic flow, if not all electrokinetic flow of particles, moving fluid through the system instead using pressure driven flow.

[1] See J.I. Molho et. al., "Fluid Transport Mechanisms in Microfluidic Device," Micro-Electro-Mechanical Systems (MEMS), *1998 ASME International Mechanical Engineering Congress and Exposition* (DSC-Vol.66), second page, left column ("Molho") (available at http://mems.stanford.edu/~aeh/publications/Molho_asme98.pdf, and attached as Appendix A).

Austin describes a microfluidics device for manipulating particles with dielectrophoresis. Austin describes driving fluid through the system using pressure driven flow or electrophoretic flow. See col. 10, lines 40-49 and col. 14, line 62-col. 15, line 6. When electrophoretic flow is utilized to move fluid through the system Austin specifically states that the sample must have a net charge and a non-zero electrophoretic mobility. See col. 14, lines 65-67. Later, in a disclosed example, Austin explicitly teaches away from using electroosmotic flow by specifying that an electroosmosis suppressing agent be used. See col. 20, lines 31-32. Thus, Austin specifically teaches suppressing electroosmotic flow.

Devices that employ electroosmotic flow in addition to electrophoretic flows are superior in many applications to devices that employ purely electrophoretic flows, such as embodiments of Austin's device. For example, blocking electroosmotic flow requires an extra step that adds manufacturing or operating complexity. The resultant device may be difficult to integrate with other devices that utilize electroosmotic flow or are otherwise incompatible with the chemicals used to suppress electroosmotic flow. Further, the electrophoretic mobility of most biological particles is low compared to the electroosmotic mobility of many glass and plastic surfaces, thus the throughput of purely electrophoresis-drive devices is typically dramatically lower than that of electrokinesis-driven devices employing electroosmotic flow.

Turning now to the claims, Applicants have amended claim 1 to specifically recite electrodes that generate a spatially non-uniform electric field across a non-uniform array of insulating features "that avoids suppressing electroosmotic flow in the device." As discussed above, Austin teaches just the opposite. Specifically, Austin teaches only pressure-driven or electrophoretic transport and specifically teaches suppression of electroosmotic flow. Accordingly, Applicants respectfully submit that claim 1 is patentable over Austin. Claims 2-11 are patentable over Austin at least because they depend from and include all limitations of patentable claim 1, and further because of the additional limitations added by those claims.

Applicants have amended claim 14 to specifically recite a method that involves generating a spatially non-uniform electric field that exerts a dielectrophoretic force on particles in a sample fluid passed across a non-uniform array of insulating features thereby constraining motion of at least one particle "while avoiding suppression of electoosmotic flow of the sample fluid." As discussed above, Austin teaches only pressure-driven or electrophoretic transport and specifically teaches away from the subject matter of claim 14 since Austin teaches *suppression*

of electroosmotic flow. Accordingly, claim 14 is patentable over Austin. Claims 15-18 are also patentable over Autin at least because they depend from and include all limitations of patentable claim 14, and further because of the additional limitations added by those claims.

Applicants have further added claims 19 and 20 which specify that electrokinetic and electroosmotic transport, respectively, are employed in passing a sample fluid across an array. Accordingly, claims 19 and 20 are further patentable over Austin.

Claim Rejections – 35 U.S.C. § 103

Claims 7, 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Austin et al. in view of Christel et al. (U.S. Patent Number 6,368,871).

As an initial matter, claim 7 depends from and includes all limitations of Applicants' amended claim 1. As discussed above, Applicants respectfully submit that Austin fails to disclose all limitations of Applicants' claim 1 including electrodes generating a spatially non-uniform electric field "that avoids suppressing electroosmotic flow in the device." Applicants submit that Christel also does not disclose this feature, and for at least this reason claim 7 is patentable over the cited references. Claim 7 is additionally patentable over the combination of the Austin and Christel because Applicants submit there is no suggestion or motivation to combine the references, as is described more fully below.

Additionally, Applicants have amended claim 12 to place the claim in independent form. Claim 13 depends from claim 12. Applicants submit the amendment did not alter the scope of claim 12 or claim 13.

To establish obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference teachings. Applicants respectfully submit that the Examiner has not provided the requisite motivation to combine the reference teachings.

Austin discloses devices for the manipulation of particles using dielectrophoresis. See abstract. Austin teaches structure designed to attract, and trap, particles in *the gap* formed between insulating structure constrictions. See Fig. 1D and col 7, lines 20-22 and col. 7, lines 34-53.

In contrast, Christel describes structures useful for fast, efficient mixing of fluids. See col. 5, lines 38-43. In some embodiments, Christel teaches that the structures may be used to

extract particles in that the particles can be brought into physical contact with the formed microfeatures. See col. 8, lines 53-55 ("target moieties will physically come into contact with the columns"). See also col. 9, lines 15-18.

There would be no reason for a skilled artisan to reach for the devices disclosed by Christel, designed to bring particles into physical contact with the structures, and incorporate them into the system disclosed by Austin, designed to trap particles in the space created between structures. The Examiner suggests the combination would be desirable because Christel discloses the array is optimized for efficient interaction with target moieties in a fluid (see Office Action, page 9 and Christel, col. 7, lines 12-16). However, Christel is referring to bringing those target moieties into contact, indeed binding to, the designed structures. See col. 8, lines 52-54. Accordingly, Christel does not motivate the use of the arrays in a system designed to trap particles in a gap between structures.

Accordingly, because there is insufficient motivation to combine the teachings of Austin with those of Christel, Applicants respectfully submit that claims 12 and 13 are patentable over the combination for this additional reason.

Further, Applicants respectfully submit that Christel fails to disclose or suggest the "radial array" recited in Applicants' claim 12. Nowhere does Christel explicitly disclose a circular or radial array, with features arranged according to a radial distance from a center. In Fig. 8, Christel appears to disclose a diamond-shaped array that is simply the familiar grid pattern of posts turned at an angle. The posts are not arranged along a radius from a center of the array. Applicants respectfully submit that Christel's Fig. 8 does not show a "radial array" as claimed in Applicants' claim 12, one embodiment of which is depicted in Applicants' Fig. 1. Accordingly, Applicants respectfully submit that claim 12 is patentable over Austin in view of Christel.

Still further, Applicants respectfully submit that both Christel and Austin fail to disclose a radial array of posts where the "diameter of the posts increases according to their radial position in said radial array," as recited in Applicants' claim 13. The Examiner does not suggest that Christel discloses this feature, and Applicants agree. Austin also fails to disclose posts whose diameter varies with their radial position in an array. Austin is limited to disclosure of features that vary in linear rows across a device. See Figs. 8-9. Accordingly, Applicants respectfully submit claim 13 is patentable over Austin in view of Christel.

Double Patenting

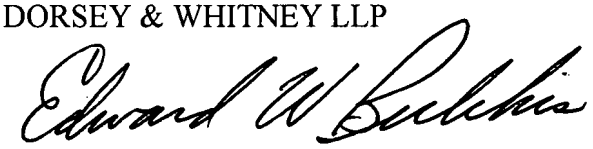
Applicants note the nonstatutory double-patenting rejection over U.S. Patent Number 7,014,747 and the provisional nonstatutory double-patenting rejections over U.S. Application Nos. 10/176,322 and 10/969,137. Applicants respectfully request that the nonstatutory double-patenting rejections be held in abeyance until allowable subject matter is indicated.

Conclusion

Applicants respectfully submit that all claims are now in condition for allowance. Favorable consideration and a timely Notice of Allowance are earnestly solicited.

Respectfully submitted,

DORSEY & WHITNEY LLP



Edward W. Bulchis
Registration No. 26,847
Telephone No. (206) 903-8785

EWB:dms

Enclosures:

- Postcard
- Check
- Fee Transmittal Sheet (+ copy)
- Replacement Abstract
- Replacement Drawing Sheets (4)
- Annotated Drawing Sheets Showing Changes (2)
- Exhibit A
- Supplemental IDS, Form PTO-1449 and cited reference (1)

DORSEY & WHITNEY LLP
1420 Fifth Avenue, Suite 3400
Seattle, WA 98101-4010
(206) 903-8800 (telephone)
(206) 903-8820 (fax)

Annotated Sheet
Showing Changes

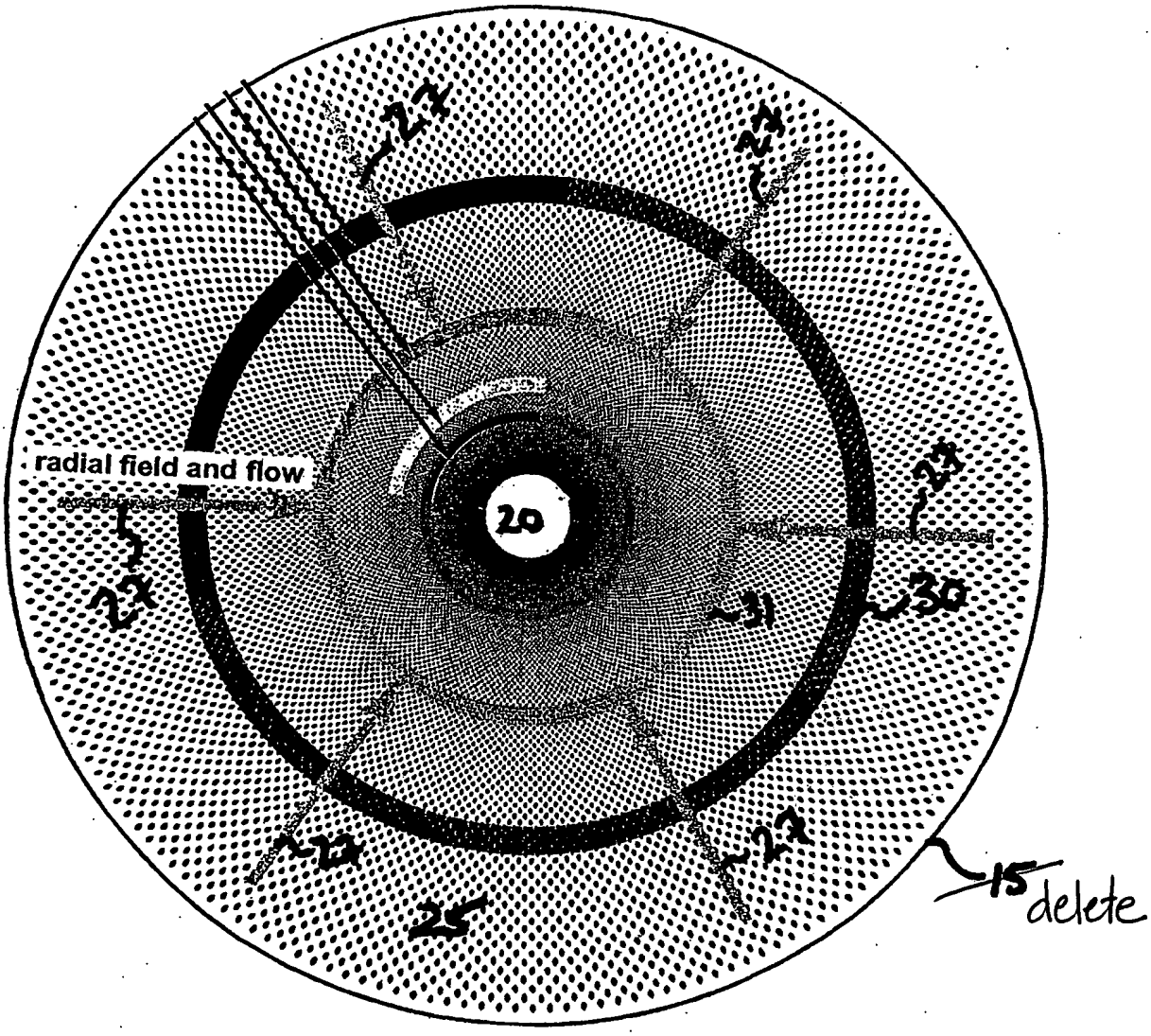


FIG. 1

Annotated Sheet
Showing Changes

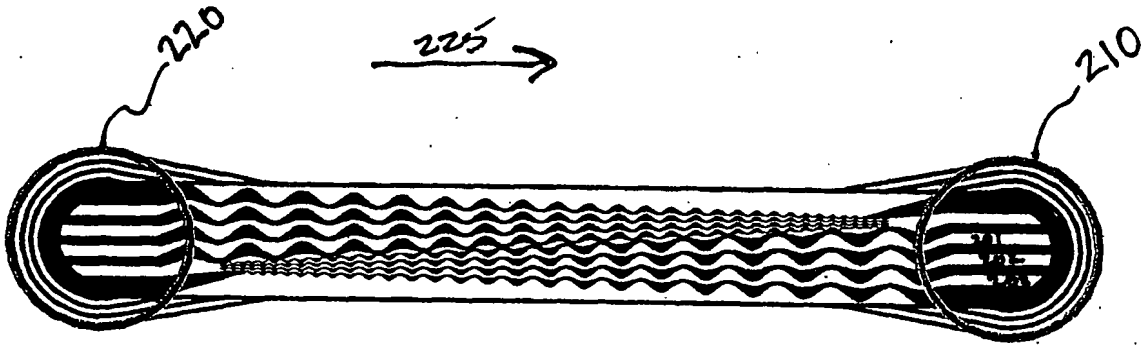


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FIG. 3